Application of synthetic pheromones on animals in captivity: A possibility on wild ungulates?

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Introduction

There is an increasing evidence proving the existence of diverse abnormal behaviours due to stress on captive animals. The growing awareness for animal welfare, specifically for those captive in zoos or similar centres accommodating wild animals, has triggered that numerous measures of environmental enrichment are being implemented all over the globe. A recent practice of environmental enrichment to reduce the stress of wild animals in captivity is the employment of different odours and specifically the use of pheromones.

Objectives

- To examine the potential use of synthetic analogues of pheromones as a method of environmental enrichment of captive animals, particularly for wild ungulates.
- To conduct a specific case study to examine the behaviour of wild ungulates in captivity in response to different stress conditions.
- To conduct a literature review to describe the state-of-the-art on the role of pheromones when it comes to social communication of ungulates and to analyse literature addressing the effects of environmental enrichment with pheromones (Müller-Schwarze, 1971; Macri and Patterson-Kane, 2011).

Methodology

- The **fieldwork** was conducted at the reserve of autochthonous wild animals of **Molló Parc**.
- Two wild ungulates in captivity have been examined in this study:
  - The **fallow deer** (*Dama dama*).
  - The **wild goat** (*Capra pyrenaica*).
- The animals were observed from March 2015 until May 2015 during periods of high affluence of visitants and during days of less affluence.
- **Literature review** on the role of pheromones on the communication of ungulates and the effects of enrichment with pheromononatherapy

- Two **indicators** were employed:
  - The metabolites level of **cortisol on faeces**,
  - **The number of vigilance and displacement behaviours** through continuous focal sampling by visual observation.

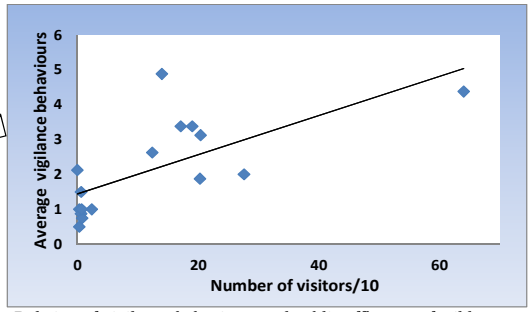
- The **statistical analysis** of the collected data comprised a paired Student t-test ($p<0.05$) and regression analysis. Both interspecific and intraspecific differences were explored.
- **Hypothesis**: Large public affluence trigger greater levels of stress (vigilance behaviours and faecal cortisol levels) in fallow deer and wild goat.

Results

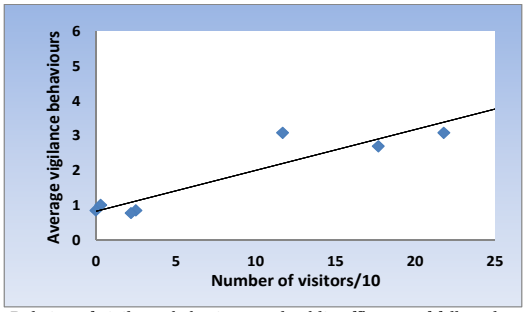
Both fallow deer and wild goat suffer from greater stress when public affluence is large.

There is still not enough data to conduct a complete analysis of the faecal cortisol indicator.

The paired Student t-test comparing vigilance behaviours and public affluence shows a high statistical significance **($p<0.01$).**



Relation of vigilance behaviours and public affluence of wild goat



Relation of vigilance behaviours and public affluence of fallow deer

Conclusions

I. **Pheromones play an important role in the social communication** of many animals, including all species of ungulates.

II. The growing concern of the stress that wild animals in captivity live through has led to pursue various **methods of enrichment**, as the extraction of synthetic pheromones and the use of **pheromonatherapy**.

III. **The hypothesis has been confirmed**: The available data indicates, with a very high statistical significance, that **the presence of visitors generates stress** on the two groups of wild ungulates in captivity considered, namely fallow deer and wild goat.

IV. Synthetic pheromones and the use of **pheromonatherapy would make sense on wild ungulates in captivity**.

References

Macri, A., Patterson-Kane, E., 2011. Behavioural analysis of solitary versus socially housed snow leopards (Panthera uncia), with the provision of simulated social contact. Applied Animal Behaviour Science, 130: 115-123.

Müller-Schwarze, D., 1971. Pheromones in black-tailed deer (Odocoileus hemionus columbianus). Animal Behaviour, 19: 141-52.

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